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FCC should revoke MariTEL's VHF Channel 87B license
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In 1997 the World Radio Commission (WRC) dedicated 2 channels to a new maritime navigation and tracking instrument called 'Automatic Identification System' (AIS). The 2 Very High Frequency (VHF) channels dedicated to AIS worldwide were 87B and 88B. They center around 161.975 and 162.025 Mega Hertz (MHz) respectively. They were dubbed AIS1 and AIS2.

AIS consists of a radio that transmits a ship's identification as well as its GPS information It alternates these transmissions between AIS1 and AIS2. It transmits identification information every 6 minutes and position information much more frequently (between 3 minutes and 2 seconds depending on a ships speed and rate of turn).

AIS also has 2 receivers, one for AIS1 and one for AIS2 (and a third one for VHF Channel 70 centered around 156.525 MHz for channel management purposes).

Just like radar, AIS allows ships to track each other, but unlike radar, AIS allows ships to identify each other. AIS also has a greater range than radar and can 'see' ships that radar can't because they are hidden behind capes or islands. AIS, furthermore, provides much better resolution than radar: Radar echoes of 2 different ships sometimes merge and a ship's radar echo sometimes also merges with echoes from nearby shores. AIS doesn't have this problem.

Sophisticated and complex (expensive) radar can calculate a nearby ship's relative course and speed by comparing the relative position of a number of sequential radar echoes of the same ship. Most of these can also calculate and show the absolute Course Over Ground (COG) and the Speed Over Ground (SOG) of nearby ships by taking into account own ship's GPS position, SOG and COG. This capability is called Automatic Radar Plotting Aid (ARPA). AIS doesn't have to derive this information from, sometimes fuzzy, echoes. It receives position, COG and SOG directly from the nearby ship and as a result it has been found to detect nearby ship's course changes well before ARPA was able to detect them. Course change detection is important for collision avoidance purposes.

While AIS will never replace radar as a collision avoidance tool, it significantly enhances the knowledge of the Officer Of the Watch (OOW) about his current traffic situation. AIS is fast becoming an indispensable tool for traffic awareness and collision avoidance.

For it to work every ship needs to carry AIS. The International Maritime Organization (IMO) made AIS carriage mandatory on ships > 300GRT on international voyages by 2008. After the events of September 11, 2001 the United States Coast Guard (USCG) decided that it needs to identify and track ships that approach US waters through AIS sooner. It convinced IMO to accelerate carriage requirements to year-end 2004. The USCG, for the same reason, expanded mandatory carriage in US waters to much smaller ships, some as small as 26' in length.

The lack of availability of AIS1 and AIS2 in the US severely complicates roll-out of AIS infrastructure (base stations). As part of a program to raise money the Federal Communications Commission (FCC) auctioned off portions of the radio spectrum. It was very successful in doing so in many frequency bands, for instance in the bands used by cellular phone companies. FCC decided to also auction of 9 frequency bands that are used for mobile maritime purposes including AIS1. USCG did not object to the auction, since at the time (1998) it wanted MariTEL to succeed, even though it was clear that AIS1 would be needed for AIS. WRC had already dedicated AIS1 (and AIS2) to AIS in 1997. FCC decided to proceed with auction anyway because it believed that it could raise more money if it sold all 9 frequency bands as a package.

Another complication for the roll-out of AIS was that AIS2 was being used by other US Federal Agencies

To accommodate these circumstances, USCG played a major role in setting standards for AIS capabilities. USCG forced the international standard setting organizations (IMO, ITU, IALA and IEC) to require AIS to be able to use channels other than AIS1 and AIS2 and to require that AIS be backwards compatible with an earlier version of the AIS standard that uses VHF Channel 70 to tell an AIS transponder to switch to different channels. The international community vehemently opposed these requirements because it made AIS much more complex and expensive than it needed to be. USCG prevailed though and now 'frequency agility' is part of the AIS standard.

USCG was able to resolve the AIS2 availability through internal US Government negotiations, but AIS1 availability remained a problem.

FCC, realizing that two marine mobile channels would be needed for AIS, required the winner of the auction of the 9 marine mobile frequency bands (MariTEL) to negotiate with USCG to accommodate AIS' needs. FCC indicated that, if MariTEL and USCG were unable to come to terms, it would 're-visit' the issue.

MariTEL had big plans for the spectrum it acquired. In a joint venture with American Towers Corporation and Harris Corporation, it planned to build a nationwide network of 300 towers that were 286' high and that were connected to a call center with fiber optic cable. This infrastructure would allow MariTEL to offer telephone service via VHF to any ship or boat in US continental waters. During the early stages of this major expansion of its infrastructure MariTEL signed a Memorandum of Agreement (MOA) with USCG that allowed AIS to use AIS1 in US continental waters. One of the reasons why MariTEL consented to use AIS1 rather than another channel was that there was no 'fence' yet to keep interlopers out.

An AIS transponder doesn't switch away from the default AIS1 and AIS2 channels automatically. It needs to be told to do so via VHF Channel 70. USCG is now in the process of rolling out the infrastructure (Rescue 21) that (amongst others) will allow it to (virtually) fence off areas where AIS1 (or AIS2) cannot be used. Ships will continue to

enter US waters using AIS1 and AIS2 until such a fence has been erected. For this reason it was in MariTEL's best interest to allow AIS to use AIS1. MariTEL, at the same time, wanted to interest the USCG to use its towers rather than build its own AIS base stations.

MariTEL's business model fell apart when boaters started using cellular phones and satellite phones rather than MariTEL's VHF service for shore-to-ship and ship-to-shore calls. MariTEL has stopped offering VHF telephone service and is in financial difficulties. Its management team was replaced with a new one that is primarily focused on salvaging whatever is left of MariTEL's assets. One of these assets, indeed possibly the major remaining asset, at least as perceived by MariTEL's current management team, is its ownership of the 9 marine mobile frequency bands.

MartiTEL management's fiduciary responsibility to its shareholders is to squeeze as much as possible out of this asset. One way MariTEL decided it could do so was to squeeze USCG by backing out of the MOA unless MariTEL was paid for the use of AIS1. MariTEL suggested that it take over registration of AIS transponders, charge users a registration fee of $300 per transponder if the vessel was required to carry one and $375 if the vessel was not required to carry one. MariTEL furthermore proposed that it be allowed to charge vessels equipped with a transponder $75 per year, even if they were foreign flagged.

USCG will likely refuse to give in to these toll demands not in the least because it would make it very unlikely that vessels would voluntarily carry AIS. AIS only works if all ships participate. Also, USCG was already experiencing problems with requiring fishing boats and passenger vessels to carry AIS, mostly because of the high cost associated with purchasing and installing AIS even without these tolls.

Roll out of AIS is now well underway with carriage already required on all ships transiting the St. Lawrence Seaway and the Panama Canal. Ships with AIS are already sailing though US waters using AIS1 and AIS2 (see for instance current AIS traffic in the Puget Sound at http://www.pintek.net).

USCG could try to avoid the MariTEL tolls by erecting fences around areas where MariTEL owns AIS1 and detour around them using some other VHF channel (if MariTEL will consent to make one available). There are a number of problems with that approach though.

First of all MariTEL is not likely to make another of its marine mobile channels available for AIS without charging the same tolls.

Also, when two ships approach each other from opposite sides of a fence, the ship outside the fenced off area will be using AIS1 and AIS2. The ship inside the fenced off area will be using some other channel and AIS2. Ships that approach each other from opposite sides of a fence thus will thus be using only AIS2 to communicate with each other. Doing so cuts the position and identification update frequency by 50%. This

significantly reduces AIS' value as an identification tool because such messages will only be exchanged every 12 minutes. For these reasons fences will be dangerous areas from a collision avoidance point of view.

Furthermore, the majority of the boating public will be denied an opportunity to buy inexpensive AIS (Class B) transceivers because they would have to be frequency agile rather than just be designed around AIS1 and AIS2. Such inexpensive (about $500 MSRP) devices can be expected to become popular collision avoidance tools when they are integrated with chart plotters, electronic charting systems and radars. The major reason why they are expected to become popular is that that a commercial ship is typically 500 to 5000 times larger than a pleasure boat. Due to its size it is impossible for a commercial ship to change course to avoid a collision with a pleasure boat. The burden for collision avoidance is clearly on the more agile pleasure boat. Most pleasure boats, however, do not carry radar, fewer still have ARPA to detect commercial ships when visibility is restricted. An AIS radio is less expensive than radar, much less expensive than ARPA and AIS allows boaters to not only track commercial ships but also to identify them. AIS radio's will likely become the primary collision avoidance device for boats that operate in and among AIS equipped commercial ships (roughly estimated to number about 1,000,000 with a length over 19'). Making AIS radio's frequency agile will likely double their cost and reduce the estimated market to roughly 250,000.

Lastly, fencing off AIS1 areas will not be possible for coastal waters, only for inland waters. VHF Channel 70 coastal base stations can erect a fence no more than about 25 Nautical Miles (NM) out. Ships approaching a fence will thus be as close as 25 NM to the coast before their transponder is switched to a channel other than AIS1. This means that AIS1 in coastal waters will experience interference from ships sailing just outside a fence.

Conversely, it is exactly those ships that USCG needs to track and identify from shore. MariTEL's use of AIS1 inside the fence will likely cause interference that will make tracking and identifying ships outside the coastal fence difficult if not impossible.

So what can we expect to happen next? I believe the time has come for FCC to 're-visit' the AIS1 issue and revoke MariTEL's license. The solution that I believe is most equitable is for FCC to offer MariTEL another marine mobile band to replace AIS1, if one can be made available.

A less elegant solution would be for FCC to buy back AIS1 from MariTEL at current market value. The failure of MariTEL to sell VHF telephone services will provide a ceiling for a reasonable buy back price. Also reducing the cost will be the interference problem in coastal waters explained above. The value would have to be based on a business case for data services on AIS1, because that is what MarTEL has indicated it would use AIS1 for. MariTEL's credibility to make a solid case for this business model will be hampered by the failure of its VHF telephone service business model.

FCC also has the option to wait until 2004 before it rules on this case. If by that time MariTEL has failed to build out its infrastructure as it agreed to do when it purchased AIS1 and other marine mobile bands, FCC can revoke the licenses to the frequency bands it auctioned off in 1998. Given MariTEL's current financial difficulties it is unlikely that it will make the 2004 deadline.

Marine Management Consulting

An AIS Consultancy

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Fred Pot received a Masters Degree in Naval Architecture and Marine Engineering from the Technical University at Delft, the Netherlands and an MBA from Stanford University. He worked for a ship weather routing company (Oceanroutes, Inc.) in the UK and spent 20 years in various management positions at Matson Navigation Company, Inc. in San Francisco and Honolulu. More recently Fred worked for Holland America Line in Seattle and as a consultant to P&O Princess Cruises in Los Angeles.

Fred has been involved in AIS since 1999 when he directed the first of three tests of AIS on Cruise Ships. He has written articles about AIS for CompuShip, The Digital Ship and Pacific Maritime Magazine. He operates a website (www.uais.org) that is dedicated to AIS and co-produced two AIS conferences in Seattle with Pacific Maritime Magazine. Fred is a member of the Technical Advisory Group of the US Delegation to Work Group 8A of Technical Committee 80 of the International Electrotechnical Commission. This Work Group is responsible for developing worldwide standards for 'Class B' AIS transponders. Fred also is a member of Work Group 13 that is responsible for developing worldwide standards for Navigation Displays that integrate AIS with Radar, ECDIS, GPS and other sensors. In May 2003 Fred was invited to give a presentation about display of AIS information at the annual conference of Radio Technical Commission for Maritime Services.

Marine Management Consulting's client list includes Transponder Manufacturers, ECDIS vendors, Cruise Lines, Pilot Associations and Ship Operators Associations.